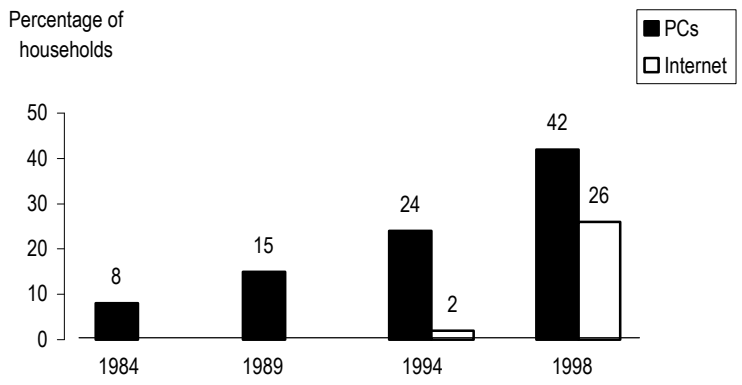
THE SOCIODEMOGRAPHICS OF ACCESS AND ADOPTION

TRENDS IN PC AND INTERNET ACCESS

Personal computers were commercially introduced in the late 1970s, and home Internet access became widely available to the general public around 1992–93. The earliest reliable data on PCs in the home is for 1984; for Internet access, it is for 1994.[11] Figure 2 shows trends in the adoption of home computers and access to the Internet in the United States. As can be seen, home ownership of PCs has grown rapidly, principally since 1994. During the 4-year interval from 1994–98, the percentage of households owning a home computer increased by 18-percentage points, twice the 9-percentage point increase for the 5-year period from 1989–94 and far greater than the 7-percent growth from 1984–89. Internet access has grown even more dramatically; the number of households connected to the Internet has risen from 2 percent of all households in 1994 to 26 percent in 1998.

Figure 2. Percentage of U.S. households owning a home computer and percentage of U.S. households with access to the Internet



SOURCES: All data are from the U.S. Bureau of the Census, except the 1994 Internet data point, which is from Clemente (1998).

The recent rapid growth in home adoption of IT masks considerable disparities in access by income levels, ethnicity, and geographic location. Using data from the Current Population Survey (CPS) conducted by the Census Bureau, the National Telecommunications and Information Administration (NTIA) found that the "digital divide" is worsening among Americans (NTIA 1995, 1998, and 1999). From 1994–98, the gap in PC ownership between white and black and Hispanic households widened, as did the gap between rich and poor. Although ownership of home computers and Internet access increased in all income and racial/ethnic categories during these 4 years, the disparity in ownership has widened. For example, in 1998, 46.6 percent of white households owned a home computer, compared to 23.2 percent of black households—a gap that increased by nearly 7-percentage points from 1994 (NTIA 1999). Notably, PC ownership is greatest for households of Asian/Pacific Islander heritage—55 percent of such homes own a PC.

These racial/ethnic differences cannot be accounted for solely by affluence: the CPS survey data indicate that within every income category, black households lag white households substantially in their adoption of home computers and linkage to the Internet, although the gap is not as large at higher income levels. NTIA (1999) reports that "The role of race or ethnic origin is highlighted when looking at similarly situated families. A white, two-parent household earning less that $35,000 is nearly *three times* as likely to have Internet access as a comparable black household and nearly *four times* as likely to have Internet access as Hispanic households in the same income category." Geographic location also has an impact on household PC ownership and Internet access beyond what can be predicted by income levels. Homes in rural areas are less likely to own PCs or be connected to the Internet even when income is held

[11]Data on Internet access for households do not necessarily reflect a constant subscription to the Internet. Households can sign up for Internet access and then subsequently drop or switch service providers. These data thus reflect snapshots of households connected to the Internet at the point in time when the survey was administered.

constant in statistical analyses (NTIA 1999). Certain groups thus appear to show consistently low levels of home IT access, particularly homes that are low income; black, Hispanic, or Native American; less educated; headed by single females; and located in the South, rural areas, or central cities.

Clemente (1998) is the only author to provide detailed data on trends in Internet access and the characteristics of Internet users. Based on data from the American Internet User Survey conducted by Cyber Dialogue, he finds that Internet use is strongly skewed toward male, well-educated, affluent individuals from knowledge-based occupations (this survey does not obtain data on race/ethnicity):

- Men represented 61 percent of Internet users in 1997 (although down from 78 percent in 1994).
- Forty-three percent of adults in Internet user households were college graduates, compared to 21 percent of the U.S. adult population.
- The average income of Internet user households in 1997 was $57,600, well above the national average of $44,900.
- Forty-seven percent of adults in Internet user households are knowledge workers compared to 27 percent for the general population, and far more household users are either self-employed or own their own home-based business compared to the general population.

Clemente notes a distinct trend toward broader representation on the Internet. Since 1994, users have become slightly older and less educated. They also represent a wider variety of occupations and are substantially less male.

Overall, the sociodemographic data on access to home computers and the Internet suggest that, in spite of the recent rapid diffusion and increased access to these technologies, notable inequities still exist. Some minorities,[12] the poor, and the less educated lag other social groups in terms of IT access and use; this gap appears to be widening rather than narrowing (NTIA 1995 and 1998). Although regional differences can be found, such as lower Internet connection rates in rural and inner city areas, these disparities disappear once socioeconomic factors are taken into account.

Determinants of IT Adoption

The literature on technological diffusion in households shows that there is a consistent socioeconomic (income, education, occupation) early adoption bias by individuals who are affluent, more highly educated, and from higher status occupations compared to society as a whole.[13] The data and research on home adoption of PCs and Internet linkages reinforce our existing understanding of early adopter patterns. In a study of home IT adoption among member countries, the Organisation for Economic Co-operation and Development (1998) reports that income is the most important differentiating factor with respect to household penetration rates of home computers—the R^2 for this association was .77. Income and other socioeconomic factors were identified as strong predictors of adoption in many studies, including those by Bruce (1988) on the adoption of teletext services in the early 1980s and by Riccobono (1986), Dickerson and Gentry (1983), McQuarrie (1989), and Novak and Hoffman (1998) on the adoption of home computers. The NTIA (1995, 1998) studies discussed above, as well as Clemente's (1998) findings on Internet households, substantiate the significant impacts of income, education, and occupation on PC ownership and on-line access. In a major review of the literature from 1980–87 on home IT diffusion and impacts, Dutton, Rogers, and Jun (1987) find that level of formal education is the "single variable most consistently associated with the adoption of computing" and that socioeconomic factors are regular predictors of home IT adoption. Twenty years' worth of research thus consistently demonstrates the core influence of socioeconomic factors on home IT adoption.

Demographic variables are also important. Novak and Hoffman (1998) and Hoffman, Novak, and Venkatesh (1998) find complex relationships between home IT access, race, income, and levels of education. In these studies, some racial lags in home IT access emerged that could not be accounted for by level of income or education. Differences in levels of home computer ownership between blacks and whites were statistically significant after controlling for level of educa-

[12]The CPS data reported by NTIA indicate that Asian/Pacific Islander households have higher levels of computer ownership than white households at all income levels.

[13]This pattern holds across all kinds of household products, technologies, and innovations. See Dickerson and Gentry (1983) and McQuarrie (1989) for a review of this literature.

tion, and income alone could not account for extreme disparities between white and black students with respect to computer ownership.[14] The NTIA studies also identify persistent differences among racial/ethnic groups that cannot be accounted for by level of income or education.

A few other factors are suggested by the empirical research as important influences on IT adoption dynamics. *Family structure* (marital status of head of household, presence of children in the household, age of the head of household) emerged in several studies as a differentiating factor for home PC and/or Internet access (NTIA 1998; Clemente 1998; Caron, Giroux, and Douzou 1989; Dutton, Rogers, and Jun 1987; and Venkatesh and Vitalari 1987). In general, families with children and married parents were more likely to adopt PCs or link to the Internet than single people, couples without children, single heads of household, or households headed by very young adults. (Income could be an intervening factor for these latter two family structures.) Also, individuals with *a positive attitude toward technology or computers* are, not surprisingly, more inclined to adopt PCs than are others (Gentry and Dickerson 1983; Dutton, Rogers, and Jun 1987; and Venkatesh and Vitalari 1987). Finally, there appears to be a *gender difference* in the decision to purchase a home computer. Several studies reported that the decision to buy a home computer was usually made by the male head of household, sometimes even over a wife's objections (Caron, Giroux, and Douzou 1989; Giacquinta, Bauer, and Levin 1993; and Dutton, Rogers, and Jun 1987).

[14]The authors found that 73 percent of white high school and college students owned a home computer, contrasted to 33 percent of black students.